

Radiation – Induced Degradation of Nb₃Sn Based Electrical Insulation of Superconducting Magnets' Coils

M. Chorowski, J. Polinski, P. Bogdan,

Wroclaw University of Technology, Wyb. Wyspianskiego 27, 50-370 Wroclaw, Poland

Abstract

Implementation of the wind-and-react technology to electrical insulation of coils of Nb₃Sn based superconducting magnets required new insulating materials to be developed. Previously used Kapton® is not applicable, due to its relatively low melting temperature. The new materials should be resistant to large doses of the synchrotron radiation, as well as have good thermal conductivity in helium temperatures and excellent mechanical properties. In order to properly determine degradation, comparative thermal, mechanical and electrical measurements of materials before and after radiation were carried out. The radiation was conducted in liquid nitrogen with 11 kGy/min intense and 4MeV energy electrons beam to a total dose of 50 MGy. The procedure of irradiation and the results of the measurements of four different materials will be presented.